

Communication problems between different engineering domains in HW/SW-codesign

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Abstract

Nowadays projects often require a kind of participation or even a fusion between hardware and software. This fact gives us a clarity about the communication problems between different professional groups. Different perceptions and ways of thinking increase the complexity of the project and elucidate the communication problems. Therefore the usage of different tools and help-programs is of great importance. Using an example we show in this Paper some different representations of the same project from different points of view. The dependencies of these views and the associated tools are presented, so an avoidance of the communication problems and a better collaboration of experts from the different professional groups can be achieved.

1 Problems

According to Nikita [3] the following problems are existing in hardware software co-design:

- A problem in HW / SW co-design is the growing complexity, due the three existing "inter-module relation types" (hardware, software and interfaces), rather than one in a normal development of hardware or software
- Splitting into the three levels: hardware, software and interfaces. Project management must monitor the current status of each module and hold them in line with the objectives and requirements

- The co-design process also needs some integrated milestones so the work on hardware and software can be synchronized
- The transfer of functionality to other levels (modules) must be documented. In addition, adjustments are necessary to keep the project consistent
- The repository must be able to manage both hardware and software documents. Also the interfaces between those modules must be stored
- The various backgrounds (levels of knowledge or expertise) of the developers are important, since these might cause the communication problems too.

This are the problems we are going to discuss in this paper using a real example. To determine the causes of communication problems, their impacts and consequences is a combination of learning, data mining and analysis techniques are required. There is a lot of literature (software engineering) and empirical data that could be used as an information base to identify potential problems. Analysing the empirical data / information (with the help of social-scientific approaches) is helpful to determine the effects and consequences more precisely. The following problems have already been analysed and the following solutions have been found [2]:

- One Way Communication Channels: Problem of transmitting the information, without getting any feedback, if the task or information was received and understood correctly.

- The war of notes: Everybody making their own notes without mention them in the project documentation, so for example two people working on the same task doesn't really know what the other one is do.
- Organizational barriers: The communication between groups of different processes and tasks is difficult, because they are mostly separated.
- The missing link: The inability to trace the human sources of actual requirements and their related information is identified as the culprit of the requirements traceability problem.

Because of the various views that arise through the different perceptions of the same hardware-software project it is difficult for the different professional groups to communicate to each other. The best selection of the team members is the one, in which all aspects of a project, the hierarchy and the distribution of knowledge are covered, but this is rarely the case. So the team members need first of all the additional knowledge / information to be able to work productively in team. Because of the specific expertise and the knowledge base, various personal groups interpret the project objectives different. So it is of great importance that the interfaces between the work packages are clearly specified and that every team member working on a package adhered to them. Some times people from the different professional groups even mean different things by using the same term. Therefore it is important to agree on terms and / or possibly use tools to facilitate the communication.

2 Example

A good example for the communication problems between people in a group is the "telephone game". In this game there is a message, that should be transmitted over several people. This message is selected by the first person and may only be whispered once to the next one. The last person must recite the message arrived. Mostly the message, the last one in the row, received doesn't make any sense or barely matches the original. [1]

This game is the best illustration for the information forgery through the multiple distribution, whereby a communication failure is inevitable.



Figure 1: Telephone Game [1]

The basic problem of this type of communication is the subjective perception of information that is changed by passing the message from one person to another. cf. [1]

3 Tools

3.1 Wiki

A Wiki can be used as a communication platform. It is possible to manage documents or other data using it, or even establish work groups managing users. It is possible for the team members to communicate with one another via "chat" / "video", thereby, for example, the locally separated members can take part in a meeting too. In addition, it offers the opportunity to create a common knowledge base. (E.g.: interfaces to various fields can be documented and published online). Modelling can be described and explained in wiki, so the better training in the topic general points is possible. It gives also the possibility to give a feedback to the individual team members during the project. [4]

3.2 Structured communication

Another way to bring all team members to the right level of information is to structure the communication. Requirements engineering performed by the proper project planning sets up milestones, time schedule and competences. In addition, all the tasks, included by the requirements specifications are explained and specified. So a proper project documentation helps to structure the communication within a project group, and helps to avoid the communication problems. [3]

4 Conclusion

By using tools and being aware of the possible problems, the avoidance of future communication mistakes between the different professional groups can be achieved. Especially for the extensive projects the use of these programs and tools, as well as the review of the interim results and their understanding is essential. Tools that help us to transfer the results in different domains are very helpful, but nevertheless no one should trust these tools blindly, without any verification. Automatic tools are not always delivering the right results, but generate an enormous relief.

References

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